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AgNPs coated handmade paper/pads from solid agro waste and its applications

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Solid waste is one of the biggest problems of civil society. Application of modern technology in fusion with science would be a solution for the problem. Green nanotechnology based approach using waste materials have been accepted as an environmental friendly and cost effective approach for diverse eco-friendly applications. In the present work, agriculture wastes like sugarcane bagasse, banana fibres and orange peels were used to produce handmade paper, which is alkali-free and non-pollution manufacturing process. The quality of handmade paper was checked by determining GSM, pH, thickness, bulk and solubility of the handmade paper. The handmade paper was further coated with green silver nanoparticles synthesized from Aloe vera leaf extract with dextran produced by mutant strain of Weissella confusa as a reducing and stabilizing agent and checked for their antibacterial activity against *Staphylococcus*, *Bacillus*, *E. coli*, *Pseudomonas*, *Klebsiella* species and antifungal activities against *Fusarium*, *Penicillium*, *Trichoderma*, *Pythium* and *Aspergillus* species respectively. The maximum activity was observed against *Staphylococcus* sp. and *Aspergillus* sp. with a zone of inhibition of about 1.2cm and 1cm respectively.

Therefore, the produced handmade paper may serve as an alternative biodegradable packaging material for one time use or short-duration packaging requirement for low shelf-life products like fresh fruits and vegetables. Thus, the handmade paper serves as an eco-friendly substitute for the use of non-renewable and non-biodegradable plastic-based packaging materials, as the study of recyclable and biodegradable polymers is a fascinating and developing area in packaging science.

Keywords: Biowastes, handmade paper, green silver nanoparticles, antimicrobial activity